

IN THE CLAIMS:

Listing of Claims:

These claims will replace all prior versions of claims in the present application.

1. (Cancelled)
2. (Previously Presented) An isolated DNA molecule comprising a nucleotide sequence that encodes a protamine polypeptide, wherein the nucleotide sequence is as set out in SEQ ID NO. 32.
3. (Previously Presented) An isolated DNA molecule providing an expression cassette capable of directing the expression of a protamine polypeptide in a suitable host, wherein said expression cassette comprises from 5' to 3':
 - (a) a promoter capable of expressing a downstream coding sequence in a suitable host;
 - (b) a DNA sequence coding for the expression of the protamine polypeptide; and
 - (c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32.
4. (Cancelled)
5. (Previously Presented) Isolated DNA molecule according to claim 2, wherein the coding nucleotide sequence is a cDNA, genomic or manufactured DNA sequence.

6. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the coding nucleotide sequence is fused with a suitable signal peptide encoding sequence.

7. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the promoter, or the coding nucleotide sequence, or the promoter and the coding nucleotide sequence, are selected to ensure expression in an eucaryotic host.

8. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the promoter, or the coding nucleotide sequence, or the promoter and the coding nucleic acid sequence, are selected to ensure expression in a procaryotic host.

9. (Previously Presented) Isolated DNA molecule according to claim 7, wherein the promoter is an inducible promoter.

10. (Previously Presented) A plasmid or vector system comprising one or more DNA molecules according to claim 2.

11. (Currently Amended) A procaryotic or eucaryotic host cell, ~~seed, tissue or whole~~ microorganism transformed or transfected with the DNA molecule according to claim 3 in a manner enabling said host cell, ~~seed, tissue or whole~~ microorganism to express protamine polypeptide.

12. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed, tissue or whole~~ microorganism according to claim 11 selected from the group consisting of bacteria, fungi including yeast, insect, animal and plant cells, ~~seeds, and tissues, whole animal organisms and whole plant organisms.~~

13. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed, tissue or whole~~ microorganism according to claim 12 that is a procaryotic host cell, wherein the procaryotic host cell is a bacterium selected from the group consisting of proteobacteria including members of the alpha, beta, gamma, delta and epsilon subdivision, gram-positive bacteria including Actinomycetes, Firmicutes, Clostridium and relatives, flavobacteria, cyanobacteria, green sulfur bacteria, green non-sulfur bacteria, and archaea.

14. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed, tissue or whole~~ microorganism according to claim 13, wherein the procaryotic host cell belongs to the group of proteobacteria selected from the group consisting of Agrobacterium, Rhodospirillum, Rhodopseudomonas, Rhodobacter, Rhodospirillum, Rhodospirillum, Rhizobium, Nitrobacter, Aquaspirillum, Hyphomicrobium, Acetobacter, Beijerinckia,

Paracoccus, Pseudomonas, ammonia-oxidizing bacteria including Nitrosomonas, Enterobacteriaceae, and Myxobacteria including Myxococcus.

15. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 13, wherein the procaryotic host cell belongs to the group of gram-positive bacteria selected from the group consisting of Actinomycetes and Firmicutes including Clostridium and relatives including Bacillus and Lactococcus.

16. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 13, wherein the procaryotic host cell belongs to the group of flavobacteria selected from the group consisting of Bacteroides, Cytophaga and Flavobacterium.

17. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 13, wherein the procaryotic host cell belongs to the group of cyanobacteria selected from the group consisting of Chlorococcales including Synechocystis and Synechococcus.

18. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 13, wherein the procaryotic host cell belongs to the groups of green sulfur bacteria or green non-sulfur bacteria selected from the group consisting of Chlorobium and Chloroflexaceae including Chloroflexus.

19. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism according to claim 13, wherein the procaryotic host cell belongs to the group of archaea selected from Halobacteriaceae including Halobacterium.

20. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism according to claim 12 that is an eucaryotic host cell or ~~whole~~ microorganism that is a fungi including yeast selected from the group consisting of Ascomycota including Saccharomycetes including Pichia and Saccharomyces, and anamorphic Ascomycota including Aspergillus.

21. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism according to claim 12 that is an eucaryotic host cell that is an insect cell selected from the group consisting of SF9, SF21, Trychplusiani and MB21.

22. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism according to claim 12 that is an eucaryotic host cell that is an animal cell selected from the group consisting of Baby Hamster Kidney (BHK) cells, Chinese Hamster Ovarian (CHO) cells, Human Embryonic Kidney (HEK) cells and COS cells.

23. (Currently Amended) The prokaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism according to claim 12 that is an eucaryotic host cell that is a plant cell selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta* and Spermatophyta including *Gymnospermae* and *Angiospermae*, wherein *Angiospermae* include *Magnoliopsida*, *Rosopsida*, and *Liliopsida*.

24. (Currently Amended) A method of transforming or transfecting a procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism -with a DNA molecule in a manner enabling said host cell, ~~seed~~, tissue or ~~whole~~ microorganism to express a protamine polypeptide, wherein the DNA molecule provides an expression cassette capable of directing the expression of the protamine polypeptide in the host cell, wherein said expression cassette comprises from 5' to 3'

(a) a promoter capable of expressing a downstream coding sequence in a suitable host;

(b) a DNA sequence coding for the expression of the protamine polypeptide; and

(c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide, the method comprising the steps of:

(i) providing the procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism; and

(ii) performing a transformation or transfection of said host cell, ~~seed~~, tissue or ~~whole~~ microorganism with the DNA molecule according claim 3.

25. (Currently Amended) A transformed or transfected host cell, ~~seed~~, tissue or ~~whole~~ microorganism represented by or regenerated from transformants or transfectants yielded according to claim 24.

26. (Currently Amended) Method for the production of a protamine polypeptide, comprising the steps of:

(a) culturing a transformed or transfected host cell, ~~seed~~, tissue or ~~whole~~ microorganism represented by or regenerated from transformants or transfectants in culture medium under suitable conditions allowing production of said polypeptide within said host; and, optionally,

(b) isolating said polypeptide from said host or from the culture medium, wherein the transformants or transfectants are yielded by transforming or transfecting a procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism with a DNA molecule in a manner enabling said host cell, ~~seed~~, tissue or ~~whole~~ microorganism to express said protamine polypeptide, wherein the DNA molecule provides an expression cassette capable of directing the expression of the protamine polypeptide in the host cell, wherein said expression cassette comprises from 5' to 3'

(i) a promoter capable of expressing a downstream coding sequence in a suitable host;

(ii) a DNA sequence coding for the expression of said protamine polypeptide; and

(iii) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide, wherein the transformants are yielded by

(1) providing the prokaryotic or eucaryotic host cell, ~~seed, tissue or whole~~
microorganism; and

(2) performing a transformation or transfection of said host cell, ~~seed, tissue or~~
~~whole~~ microorganism with the DNA molecule according claim 3.

27. (Previously Presented) Method according to claim 26, wherein said transformed or transfected host cell is selected from prokaryotes, and wherein said polypeptide is isolated after induction of a log phase culture with a suitable inducing agent.

28. (Previously Presented) Method according to claim 27, wherein said polypeptide is isolated until said host cell re-enters log phase.

29. - 43. (Cancelled)

44. (Withdrawn and Currently Amended) A procaryotic or eucaryotic host cell, ~~seed, tissue or whole~~ microorganism transformed or transfected with the plasmid or vector system according to claim 10 in a manner enabling said host cell, ~~seed, tissue or whole~~ microorganism to express the protamine polypeptide.

45. (Cancelled)

46. (Cancelled)

47. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 14, wherein the procaryotic host cell belongs to the group of proteobacteria selected from the group consisting of Rhodopseudomonas, Pseudomonas and Escherichia.

48. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 47, wherein the procaryotic host cell belongs to the group of proteobacteria selected from the group consisting of Rhodopseudomonas palustris, Pseudomonas fluorescens, and Escherichia coli.

49. (Currently Amended) The prokaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 15, wherein the procaryotic host cell belongs to the group of gram-positive bacteria selected from the group consisting of Bacillus subtilis and Lactococcus lactis.

50. (Currently Amended) The prokaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 16, wherein the procaryotic host cell belongs to the group of flavobacteria selected from the group consisting of Flavobacterium including Flavobacterium ATCC21588.

51. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 17, wherein the procaryotic host cell belongs to the group of cyanobacteria selected from the group consisting of *Synechocystis* sp. and *Synechococcus* sp. PS717.

52. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 18, wherein the procaryotic host cell belongs to the groups of green sulfur bacteria or green non-sulfur bacteria selected from the group consisting of *Chlorobium limicola* f. *thiosulfatophilum* and *Chloroflexus aurantiacus*.

53. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 19, wherein the procaryotic host cell belongs are *Halobacterium salinarum*.

54. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 20, wherein the eucaryotic host cell is selected from the group consisting of *Saccharomyces cerevisiae* and *Aspergillus niger*.

55. (Currently Amended) The procaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism according to claim 22, wherein the eucaryotic host cell is an animal cell selected from the group consisting of NIH 3T3 and 293 cells.

56. (Currently Amended) A method of transforming or transfecting a prokaryotic or eucaryotic host cell, ~~seed~~, tissue or whole microorganism transformed or transfected with a

DNA molecule in a manner enabling said host cell, ~~seed~~, tissue or ~~whole~~ microorganism to express a protamine polypeptide, wherein the DNA molecule provides an expression cassette capable of directing the expression of the protamine polypeptide in the host cell, wherein said expression cassette comprises from 5' to 3'

(a) a promoter capable of expressing a downstream coding sequence in a suitable host;

(b) a DNA sequence coding for the expression of the protamine polypeptide; and

(c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide, the method comprising the steps of:

(i) providing the prokaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism; and

(ii) performing a transformation or transfection of said host cell, ~~seed~~, tissue or ~~whole~~ microorganism with the plasmid or vector system according to claim 10.

57. (Currently Amended) A transformed or transfected host cell, ~~seed~~, tissue or ~~whole~~ microorganism represented by or regenerated from transformants or transfectants yielded according to claim 56.

58. (Currently Amended) Method for the production of a protamine polypeptide, comprising the steps of:

(a) culturing a transformed or transfected host cell, ~~seed~~, tissue or ~~whole~~ microorganism represented by or regenerated from transformants or transfectants in culture

medium under suitable conditions allowing production of said polypeptide within said host;
and, optionally,

(b) isolating said polypeptide from said host or from the culture medium, wherein the transformants or transfectants are yielded by transforming or transfecting a procaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism -with a DNA molecule in a manner enabling said host cell, ~~seed~~, tissue or ~~whole~~ microorganism to express said protamine polypeptide, wherein the DNA molecule provides an expression cassette capable of directing the expression of the protamine polypeptide in the host cell, wherein said expression cassette comprises from 5' to 3'

(i) a promoter capable of expressing a downstream coding sequence in a suitable host;

(ii) a DNA sequence coding for the expression of said protamine polypeptide; and

(iii) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide, wherein the transformants are yielded by

(1) providing the prokaryotic or eucaryotic host cell, ~~seed~~, tissue or ~~whole~~ microorganism; and

(2) performing a transformation or transfection of said host cell, ~~seed~~, tissue or ~~whole~~ microorganism with the plasmid or vector system according to claim 10.

59. (Previously Presented) Method according to claim 58, wherein said transformed or transfected host cell is selected from prokaryotes, and wherein said polypeptide is isolated after induction of a log phase culture with a suitable inducing agent.

60. (Previously Presented) Method according to claim 59, wherein said polypeptide is isolated until said host cell re-enters log phase.

61. (Previously Presented) Method according to claim 59, wherein said transformed or transfected host cell is selected from the group consisting of *Rhodopseudomonas palustris*, *Pseudomonas fluorescens*, and *Escherichia coli*.

62. (Previously Presented) Method according to claim 27, wherein said transformed or transfected host cell is selected from the group consisting of *Rhodopseudomonas palustris*, *Pseudomonas fluorescens*, and *Escherichia coli*.